

OXIDATION BARRIER COATINGS FOR SILICON BASED CERAMICS

ABSTRACT OF THE DISCLOSURE

5 A protective barrier coating system including a diffusion barrier coating and an oxidation barrier coating and method for use in protecting silicon-based ceramic turbine engine components. A complete barrier coating system includes a thermal barrier coating of stabilized zirconia and an environmental barrier coating of an alloyed tantalum oxide. The oxidation barrier coating
10 includes a layer of metallic silicates formed on a substrate of silicon nitride or silicon carbide to be protected. The oxidation barrier coating can include silicates of scandium, ytterbia or yttrium. The oxidation barrier coating may also include an inner layer of Si_2ON_2 between the diffusion barrier and the metallic silicate layer. The oxidation barrier coating can be applied to the substrate by
15 spraying, slurry dipping and sintering, by a sol-gel process followed by sintering, by plasma spray, or by electron beam-physical vapor deposition. The diffusion layer of essentially pure Si_3N_4 can be applied to the substrate to prevent the migration of damaging cations from the protective layers to the substrate and is preferably formed by chemical vapor deposition. A method for protecting
20 silicon based substrates can comprise a step of forming an oxidation barrier coating on a substrate, where a step of forming the oxidation barrier includes a step of sintering the oxidation barrier and substrate in a wet gas containing hydrogen.